What is the Visualization and Control System

Data visualization is a very important aspect of analyzing data. The Visualization and Control System, developed by the Program for Climate Model Diagnosis and intercomparison (PCMDI) at the Lawrence Livermore National Laboratory, was designed to provide some of the basic capabilities needed for validating, comparing, and diagnosing climate model behavior. VCS can be controlled either interactively or from a script file, or control can alternate between these modes during a CDAT session. A Python or VCS script can be saved during an interactive session and merely replayed, or it can be edited and replayed. The state−of−the−system can be dumped as a script, at any instant, and that script can be used later to restore that instant of the session.

A graphics display page is made up of one or more graphics pictures. Each picture is defined by a trio of named objects: a picture template, a graphics method, and data. These three objects are termed "Primary Objects" in VCS. The picture template (or template for short) determines the appearance of each segment of the display. The graphics method specifies the display technique (e.g., contour, vector, boxfill, etc.). The data defines what to display. Tables of attribute sets have been created for each of the primary objects, and VCS provideds the user with the capability for creating a picture by choosing entries from these tables. Once a picutre is created, it can be manipulated by changing the choice of primary objects or by altering them. VCS also includes secondary objects that describe text, lines, markers, fill areas, patterns, colormaps, format, and lists. These secondary obects are used to assign some of the attributes to the primary objects. Pictures can be manipulated by choosing different secondary objects or by directly altering these basic elements.

By combining primary and secondary objects in various ways (either at the command line or in a program), the VCS user can comprehensively diagnose and inter−compare climate model simulations. VCS capabilities includes:

- Create and modify existing template attributes and graphics methods;
- Save the state−of−the−system as a script to be run interactively or in a program;
- Save a display as a Computer Graphics Metafile (CGM), GIF, Postscript, Sun Raster, Encapsulated Postscript, TIF, etc.;
- Create and modify colormaps;
- Zoom into a specified portion of a display;
- Change the orientation (portrait vs. landscape) or size (partial vs. full−screen) of a display;
- Animate a single data variable or more than one data variable simultaneously;
- Display different map projection and continental outlines; and
- Provide point and click graphical feedback.